

## **Materials Characterization - Bulk Asbestos Analysis**

### **Laboratory Analysis Report - Polarized Light**

#### **A-1 Enviromental, Inc.**

6109 South Don Carlos Dr.  
Taylorsville, UT 84118

Attn: Cameron Hernandez

Customer Project: ASARCO Demo (south lab) 3440 S. 700 W.

Reference #: CAL09042401 Date 4/15/2009

#### **Analysis and Method**

Summary of polarizing light microscopy (PLM / Stereomicroscopy bulk asbestos analysis) using the methods described in 40CFR Part 763 Appendix E to Subpart E (Interim and EPA 600 / R-93 / 116 (Improved). The sample is first viewed with the aid of stereomicroscopy. Numerous liquid slide preparations are created for analysis under the polarized microscope where identifications and quantifications are preformed. Calibrated liquid refractive oils are used as liquid mouting medium. These oils are used for identification (dispersion staining). A calibrated visual estimation is reported, should any asbestiform mineral be present. Other techniques such as acid washing are used in conjugation with refractive oils for detection of smaller quantities of asbestos. All asbestos percentages are based on calibrated visual estimation traceable to NIST standards for regulated of asbestos. Traceability to measurement and calibration is achieved by using known amounts and types of asbestos from standards where analyst and laboratory accuracy are measured. As little as 0.001% asbestos can be detected in favorable samples, while detection in unfavorable samples may approach the detection limit of 0.50% (well above the laboratory definition of trace).

#### **Discussion**

Vermiculite containing samples may have trace amounts of actinolite-tremolite, where not found be PLM should be analyzed using TEM methods and / or water separation techniques. Suspected actinolite/vermiculite presence will be indicated through the sample comment section of this report.

Fibrous talc containing samples may even contain a related asbestos fiber known as anthophyllite. Under certain conditions the same fiber may actually contain both talc and anthophyllite (a phenomenon called intergrowth). Again, TEM detection methods are recommended. CA Labs PLM report comments will denote suspected amounts of asbestiform anthophyllite with talc, where further analysis is recommended.

Some samples (floor tiles, surfacings, etc.) may contain fibers too small to be delectable by PLM analysis and should be analyzed by TEM bulk protocols.

A "trace asbestos" will be reported if the analyst observes far less than 1% asbestos. CA Labs defines "trace asbestos" as a few fibers detected by the analyst in several preparations and will indicate as such under these circumstances.

Quantification of <1% will actually be reported as <=1% (allowable variance close to 1% is high). Such results are ideal for point counting, and the technique is mandatory for friable samples (NESHAP, Nov. 1990 and clarification letter 8 May 1991) under 1% percent asbestos and the "trace asbestos". **In order to make all initial PLM reports issued from CA Labs NESHAP compliant, all <1% asbestos results (except floor tiles) will be point counted at no additional charge.**

#### **Qualifications**

CA Labs is accredited by NVLAP and AIHA for selected test methods for bulk asbestos fiber analysis (PLM) and airborne fiber analysis (TEM). All analysts have a college degree in a natural science (geology, biology, or environmental science) or are recognized by a state professional board in one these disciplines. Extensive in-house training programs are used to augment education background of the analyst. The group leader of polarized light has received supplemental McCrone Research training for asbestos identification. Analysis performed at Crisp Analytical Labs, LLC 2081 Hutton Dr, Suite 301 Carrollton, TX 75006

Dallas NVLAP Lab Code 200349-0 TEM/PLM EPA H20 TX 01402 TDH 30-0235  
**AIHA PLM Accreditation 102929**

## Overview of Project Sample Material Containing Asbestos

**Customer Project:** ASARCO Demo (south lab) 3440 S. 700 W. **CA Labs Project #:** CAL09042401

Sample #	Layer #	Analysts Physical Description of Subsample	Asbestos type / calibrated visual estimate percent	List of Affected Building Material Types
El-7	7-1	gray insulation	12% Chrysotile	gray insulation gray layered insulation
Pl-10	10-1	gray layered insulation	46% Chrysotile	

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**Glossary of abbreviations (non-asbestos fibers and non-fibrous minerals):**

ca - carbonate	pe - perlite	fg - fiberglass	pa - palygorskite (clay)
gypsum - gypsum	qu - quartz	mw - mineral wool	
bi - binder		wo - wollastinite	
or - organic		ta - talc	
ma - matrix		sy - synthetic	
mi - mica		ce - cellulose	
ve - vermiculite		br - brucite	
ot - other		ka - kaolin (clay)	

This report relates to the items tested. This report is not to be used by the customer to claim product certification, approval or endorsement by NVLAP, NIST or any other agency of the federal government. This report may not be reproduced except in full without written permission from CA Labs. These results are submitted pursuant to CA Labs' current terms and sale, condition of sale, including the company's standard warranty and limitations of liability provisions and no responsibility or liability is assumed for the manner in which the results are used or interpreted. Unless notified in writing to return the samples covered by this report, CA Labs will store the samples for a period of ninety (90) days before discarding. A shipping or handling fee may be assessed for the return of any samples.

## Polarized Light Asbestiform Materials Characterization

**Customer Info:** Attn: Cameron Hernandez  
**A-1 Enviromental, Inc.**  
 6109 South Don Carlos Dr.  
 Taylorsville, UT 84118

**Customer Project:**  
 ASARCO Demo (south lab)  
 3440 S. 700 W.  
**Turnaround Time:**  
 24 hours

**CA Labs Project #:**  
 CAL09042401

**Date:** 4/15/2009  
**Samples Received:** 4/15/09 9:00am

**Phone #** 801-403-8803  
**Fax #** 801-967-5326

**Purchase Order #:**

Sample #	Com ment	Layer #	Analysts Physical Description of Subsample	Homo- geneo us (Y/N)	Asbestos type / calibrated visual estimate percent	Non-asbestos fiber type / percent	Non-fibrous type / percent
JC-1		1-1	tan surfacing	y	None Detected		100% qu,bi
		1-2	white drywall with paper	n	None Detected	10% ce	90% qu,gy
P-2		2-1	tan surfaced white plaster	n	None Detected		100% bi,qu,ca
		2-2	gray plaster	y	None Detected		100% qu,ca
CT-3		3-1	tan surfacing	y	None Detected		100% qu,bi
		3-2	tan ceiling tile	y	None Detected	100% ce	
CT-4		4-1	white surfacing	y	None Detected		100% ca,bi


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Analysis Method: Interim (40CFR Part 763 Appendix E to Subpart E) / Improved (EPA-600 / R-93/116)  
 Preparation Method: HCL acid washing for carbonate based samples, chemical reduction for organically bound components, oil immersion for identification of asbestos types by dispersion attaining / becke line method.

ca - carbonate	mi - mica	fg - fiberglass	ce - cellulose
gypsum - gypsum	ve - vermiculite	mw - mineral wool	br - brucite
bi - binder	ot - other	wo - wollastinite	ka - kaolin (clay)
or - organic	pe - perlite	ta - talc	pa - palygorskite (clay)
ma - matrix	qu - quartz	sy - synthetic	

Approved Signatories:

  
 Christopher Williams  
 Analyst

  
 QAC  
 Leslie Crisp, P.G.

Technical Manager  
 Chad Lytle

1. Fire Damage significant fiber damage - reported percentages reflect unaltered fibers
2. Fire Damage no significant fiber damages effecting fibrous percentages
3. Actinolite in association with Vermiculite
4. Layer not analyzed - attached to previous positive layer and contamination is suspected
5. Not enough sample to analyze

6. Anthophyllite in association with Fibrous Talc
7. Contamination suspected from other building materials
8. Favorable scenario for water separation on vermiculite for possible analysis by another method
9. < 1% Result point counted positive
10. TEM analysis suggested



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						20% fg 80% ce	
	4-2		tan ceiling tile	y	None Detected		
CT-5		5-1	white surfacing	y	None Detected		100% ca,bi
						20% fg 80% ce	
	5-2		tan ceiling tile	y	None Detected		
CT-6		6-1	white surfacing	y	None Detected		100% bi
						100% ce	
	6-2		tan ceiling tile	y	None Detected		
EI-7		7-1	gray insulation	y	12% Chrysotile		88% qu,gy,ca
EI-8		8-1	gray insulation	y	positive stop		

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EI-9		9-1	gray insulation	y	positive stop		
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PI-10		10-1	gray layered insulation	y	46% Chrysotile		54% qu,ca
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PI-11	5	11-1	tan insulation wrap				
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		11-2	gray layered insulation	y	positive stop		
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PI-12	5	12-1	tan insulation wrap				
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		12-2	gray layered insulation	y	positive stop		
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TT-13		13-1	black paneling	y	None Detected		100% qu,ma
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### AIHA PLM Accreditation 102929


Analysis Method: Interim (40CFR Part 763 Appendix E to Subpart E) / Improved (EPA-600 / R-93/116)

Preparation Method: HCL acid washing for carbonate based samples, chemical reduction for organically bound components, oil immersion for identification of asbestos types by dispersion attaining / becke line method.

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gypsum - gypsum	ve - vermiculite	mw - mineral wool	br - brucite
bi - binder	ot - other	wo - wollastinite	ka - kaolin (clay)
or - organic	pe - perlite	ta - talc	pa - palygorskite (clay)
ma - matrix	qu - quartz	sy - synthetic	

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Analyst

  
QAC  
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8. Favorable scenario for water separation on vermiculite for possible analysis by another method
9. < 1% Result point counted positive
10. TEM analysis suggested

## Polarized Light Asbestiform Materials Characterization

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 6109 South Don Carlos Dr.  
 Taylorsville, UT 84118

**Customer Project:**  
ASARCO Demo (south lab)  
3440 S. 700 W.  
**Turnaround Time:**  
24 hours

**CA Labs Project #:**  
CAL09042401

Date: 4/15/2009

**Samples Received:** 4/15/09 9:00am

Phone # 801-403-8803

Fax # 801-967-5326

**Purchase Order #:**

Sample #	Comment	Layer #	Analysts Physical Description of Subsample	Homogeneous (Y/N)	Asbestos type / calibrated visual estimate percent	Non-asbestos fiber type / percent	Non-fibrous type / percent
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OP-14

14-1 tan surfaced tan plaster

$n$	<b>None Detected</b>
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100% bi,qu,ca

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9. < 1% Result point counted positive
10. TEM analysis suggested





## **Materials Characterization - Bulk Asbestos Analysis**

### **Laboratory Analysis Report - Polarized Light**

#### **A-1 Enviromental, Inc.**

6109 South Don Carlos Dr.  
Taylorsville, UT 84118

Attn: Cameron Hernandez

Customer Project: ASARCO Demo (North Lab) 3440 S. 700 W.

Reference #: CAL09042402 Date 4/15/2009

#### **Analysis and Method**

Summary of polarizing light microscopy (PLM / Stereomicroscopy bulk asbestos analysis) using the methods described in 40CFR Part 763 Appendix E to Subpart E (Interim and EPA 600 / R-93 / 116 (Improved). The sample is first viewed with the aid of stereomicroscopy. Numerous liquid slide preparations are created for analysis under the polarized microscope where identifications and quantifications are preformed. Calibrated liquid refractive oils are used as liquid mouting medium. These oils are used for identification (dispersion staining). A calibrated visual estimation is reported, should any asbestiform mineral be present. Other techniques such as acid washing are used in conjugation with refractive oils for detection of smaller quantities of asbestos. All asbestos percentages are based on calibrated visual estimation traceable to NIST standards for regulated of asbestos. Traceability to measurement and calibration is achieved by using known amounts and types of asbestos from standards where analyst and laboratory accuracy are measured. As little as 0.001% asbestos can be detected in favorable samples, while detection in unfavorable samples may approach the detection limit of 0.50% (well above the laboratory definition of trace).

#### **Discussion**

Vermiculite containing samples may have trace amounts of actinolite-tremolite, where not found be PLM should be analyzed using TEM methods and / or water separation techniques. Suspected actinolite/vermiculite presence will be indicated through the sample comment section of this report.

Fibrous talc containing samples may even contain a related asbestos fiber known as anthophyllite. Under certain conditions the same fiber may actually contain both talc and anthophyllite (a phenomenon called intergrowth). Again, TEM detection methods are recommended. CA Labs PLM report comments will denote suspected amounts of asbestiform anthophyllite with talc, where further analysis is recommended.

Some samples (floor tiles, surfacings, etc.) may contain fibers too small to be delectable by PLM analysis and should be analyzed by TEM bulk protocols.

A "trace asbestos" will be reported if the analyst observes far less than 1% asbestos. CA Labs defines "trace asbestos" as a few fibers detected by the analyst in several preparations and will indicate as such under these circumstances.

Quantification of <1% will actually be reported as <=1% (allowable variance close to 1% is high). Such results are ideal for point counting, and the technique is mandatory for friable samples (NESHAP, Nov. 1990 and clarification letter 8 May 1991) under 1% percent asbestos and the "trace asbestos". **In order to make all initial PLM reports issued from CA Labs NESHAP compliant, all <1% asbestos results (except floor tiles) will be point counted at no additional charge.**

#### **Qualifications**

CA Labs is accredited by NVLAP and AIHA for selected test methods for bulk asbestos fiber analysis (PLM) and airborne fiber analysis (TEM). All analysts have a college degree in a natural science (geology, biology, or environmental science) or are recognized by a state professional board in one these disciplines. Extensive in-house training programs are used to augment education background of the analyst. The group leader of polarized light has received supplemental McCrone Research training for asbestos identification. Analysis performed at Crisp Analytical Labs, LLC 2081 Hutton Dr, Suite 301 Carrollton, TX 75006

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AIHA PLM Accreditation 102929



## Overview of Project Sample Material Containing Asbestos

**Customer Project:** ASARCO Demo (North Lab) 3440 S. 700 W. **CA Labs Project #:** CAL09042402

Sample #	Layer #	Analysts	Physical Description of Subsample	Asbestos type / calibrated visual estimate percent	List of Affected Building Material Types
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EI-5	5-1		white insulation	12% Amosite	white insulation
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**AIHA PLM Accreditation 102929**

### **Glossary of abbreviations (non-asbestos fibers and non-fibrous minerals):**

ca - carbonate	pe - perlite	fg - fiberglass	pa - palygorskite (clay)
gypsum - gypsum	qu - quartz	mw - mineral wool	
bi - binder		wo - wollastinite	
or - organic		ta - talc	
ma - matrix		sy - synthetic	
mi - mica		ce - cellulose	
ve - vermiculite		br - brucite	
ot - other		ka - kaolin (clay)	

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## Polarized Light Asbestiform Materials Characterization

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6109 South Don Carlos Dr.  
Taylorsville, UT 84118

Phone # 801-403-8803

Fax # 801-967-5326

**Customer Project:**

ASARCO Demo (North Lab)  
3440 S. 700 W.

**Turnaround Time:**  
24 hours

**CA Labs Project #:**

CAL09042402

**Date:**

4/15/2009

**Samples Received:** 4/15/09 9:00am

**Purchase Order #:**

Sample #	Com ment	Layer #	Analysts Physical Description of Subsample	Homo- geneo us (Y/N)	Asbestos type / calibrated visual estimate percent	Non-asbestos fiber type / percent	Non-fibrous type / percent
----------	-------------	------------	-----------------------------------------------	-------------------------------	----------------------------------------------------------	--------------------------------------	-------------------------------

P-1		1-1	tan surfaced white plaster	n	None Detected		100% bi,qu,ca
		1-2	tan plaster	y	None Detected		100% qu,ca
JC-2		2-1	white compound	y	None Detected		100% mi,ca
		2-2	white drywall with paper	n	None Detected	10% ce	90% qu,gy
CT-3		3-1	white surfacing	y	None Detected		100% ca,bi
		3-2	tan ceiling tile	y	None Detected	30% fg 70% ce	
CT-4		4-1	white surfacing	y	None Detected		100% qu,bi


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### AIHA PLM Accreditation 102929

Analysis Method: Interim (40CFR Part 763 Appendix E to Subpart E) / Improved (EPA-600 / R-93/116)  
Preparation Method: HCL acid washing for carbonate based samples, chemical reduction for organically bound components, oil immersion for identification of asbestos types by dispersion attaining / becke line method.

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Approved Signatories:

  
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Analyst

  
QAC  
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Technical Manager  
Chad Lytle

1. Fire Damage significant fiber damage - reported percentages reflect unaltered fibers
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4. Layer not analyzed - attached to previous positive layer and contamination is suspected
5. Not enough sample to analyze

6. Anthophyllite in association with Fibrous Talc
7. Contamination suspected from other building materials
8. Favorable scenario for water separation on vermiculite for possible analysis by another method
9. < 1% Result point counted positive
10. TEM analysis suggested

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		4-2	tan ceiling tile	y	None Detected	100% ce	
EI-5		5-1	white insulation	y	12% Amosite		88% qu,ca
EI-6		6-1	tan insulation		positive stop		
EI-7		7-1	tan insulation		positive stop		
DW-8		8-1	tan wrap	y	None Detected	85% ce	15% qu,bi
DW-9		9-1	tan wrap	y	None Detected	85% ce	15% qu,bi
DW-10		10-1	tan wrap	y	None Detected	85% ce	15% qu,bi


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**Crisp Analytical Laboratories, LLC.**  
2031 Hutton Dr.  
Suite 301  
Crittendon, TX 75006

**Phone: 972-488-1414**  
**Fax: 972-488-8006**  
**After hours Mobile: 469-233-5282**

[illegible]

**For internal use:**

Any initial changes regarding project ( Indicate yes by checking line ) \_\_\_\_\_

**Custody Information:**

**Samples relinquished:**

Signature / Date / Time

**Samples received:**

Signature / Date / Time

**Samples relinquished:**

Signature / Date / Time

**Samples received:**

Signature / Date / Time

24HR

**DIXON INFORMATION INC.**

MICROSCOPY, ASBESTOS ANALYSIS &amp; CONSULTING

A.I.H.A. ACCREDITED LABORATORY # 101579

NVLAP LAB CODE 101012-0

April 15, 2009

Mr. Cameron Hernandez  
A-1 Environmental, Inc.  
6109 Don Carlos Drive  
Taylorsville, UT 84118

Ref: Batch # 84005, Lab # A-1 820  
Received April 15, 2009  
Test report  
ASARCO Labs  
3440 S. 700 W. Salt Lake City, Utah 84119  
Sampled by Cameron Hernandez, 4/15/09, 1145

Dear Mr. Hernandez:

Sample A-1 820 has been analyzed by visual estimation based on EPA-600/M4-82-020 December 1982, and EPA/600/R-93/116 July 1993 optical microscopy test methods. Appendix "A" contains statements which an accredited laboratory must make to meet the requirements of accrediting agencies. It also contains additional information about the method of analysis. This analysis is accredited by NVLAP. Appendix "A" must be included as an essential part of this test report. The data for this report is accredited by NVLAP for laboratory number 101012-0. It does not contain data or calibrations for tests performed under the AIHA program under lab code 101579.

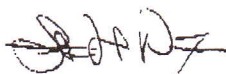
This report may be reproduced but all reproduction must be in full unless written approval is received from the laboratory for partial reproduction. The results of analysis are as follows:

Lab A-1 820, Field AI-30 Attic Insulation

This is gray mineral wool with a trace of white plaster. **Asbestos is none detected.**

In order to be sure reagents and tools used for analysis are not contaminated with asbestos, blanks are tested. Asbestos was none detected in the blanks tested with this bulk sample set.

Very truly yours,



Steve H. Dixon, President

Analyst: Steve H. Dixon

Date Analyzed: 4/15/09

78 WEST 2400 SOUTH • SOUTH SALT LAKE, UTAH 84115-3013  
PHONE 801-486-0800 • FAX 801-486-0849 • RES. 801-571-7695



Dixon Information Inc.  
78 West 2400 South  
South Salt Lake, Utah 84115  
Phone: 1-801-486-0800 Fax: 1-801-486-0849

**RUSH****BULK ANALYTICAL REQUEST FORM****Turnaround Time - Circle One****Batch Number**

P4005

**Rush** (24 hours \$25.00 per sample)**Non-rush** (5 Working days \$17.00 per sample)

Name of location sample was taken at ASARCO Labs  
Street address sample was taken at 3440 S. 700 W. Salt Lake City, Utah 84119  
Sampled by: Cameron Hernandez

Report to be sent to: Cameron Hernandez  
Company: AI Environmental Inc.  
Address: 6109 S. Dan Carlos Dr.  
City: Taylorsville State: Utah  
Zip Code: 84118  
Telephone #: 801-403-8803  
Fax #: 801-967-5326  
E-mail: aienvironmental@cameron@yahoo.com

Billing to be sent to:

Company: same  
Address: \_\_\_\_\_  
City: \_\_\_\_\_ State: \_\_\_\_\_  
Zip Code: \_\_\_\_\_  
Telephone #: \_\_\_\_\_  
Fax #: \_\_\_\_\_  
PO #: \_\_\_\_\_

Field #	Description of Sample	Samples Collected		Lab #
		Date	Time	
AI-30	Attic Insulation	4/15/09	11:45	820

**Chain of Custody**

Submission of asbestos samples for analysis and/or signing a chain of custody is the equivalent of submission of a purchase order and constitutes an agreement to pay for services provided at Dixon Information Incorporated standard schedule of fees for services.

Submitted by: [Signature]  
Received by Lab: [Signature]  
Received by Analyst: [Signature]  
Returned by Lab: \_\_\_\_\_

Date: 4/15/09 Time: 12:15  
Date: 4-15-09 Time: 12:15  
Date: 4-15-09 Time: 16:15  
Date: \_\_\_\_\_ Time: \_\_\_\_\_



## **Appendix "A"**

"This report relates only to the items tested. This report must not be used to claim product endorsement by NVLAP or AIHA."

NVLAP and AIHA requires laboratories to state the condition of samples received for testing. These samples are in acceptable condition for analysis unless there is a statement in the report of analysis that a test item has some characteristics or condition that precludes analysis or requires a modification of standard analytical methodology. If a test item is not acceptable, the reasons for non-acceptability will be given under the laboratory number for that particular test item.

### **Methods of Analysis and Limit of Detection**

In air count analysis, the result may be biased when interferences are noted.

The accuracy of asbestos analysis in bulk samples increases with increasing concentration of asbestos. Pigments, binders, small sample size, and multiple layers may affect the analysis sensitivity.

There are two methods for analysis of asbestos in a bulk test sample. Visual estimation is the most sensitive method. If an analyst makes a patient search, 0.1% or less asbestos can be detected in a bulk sample.

The second method of analysis is a statistical approach called point counting. EPA will not accept visual estimations if a laboratory detects a trace of asbestos in a sample i.e. anything less than 1% asbestos. Government agencies regulate asbestos containing materials (ACM) whenever the ACM is more than 1%. OSHA requirements apply on samples containing any amount of asbestos.

Due to the higher charge for a point count analysis, Dixon Information Inc. does not perform a point count unless authorized to do so by the client. If a sample is point counted, chemical treatments will also be used to concentrate the asbestos in the sample. This is permitted by the EPA method and it increases the accuracy of the analysis.